

# Acceptable Knowledge Guidance

Los Alamos National Laboratory  
Laboratory Implementation Guidance Document LIG 404-00-02.0  
Effective date: 07/01/99

Nonmandatory Document

## 1.0 Introduction

### 1.1 Overview

Acceptable Knowledge (AK) is a method used by the waste generator to document characterization of wastes in lieu of approved sampling and analysis. Sampling and analysis by approved methods is the most defensible means of waste characterization, but AK may be substituted if properly documented.

Waste generators may segregate and characterize wastes based on a combination of the waste-generating process, supplemental sampling and analysis, and other historical operations information. Documented AK information and data should be sufficient for accurate and complete characterization and acceptable to the receiving disposal facility.

This document complements LIR 404-00-02.

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## 2.0 Purpose

This document provides guidance for AK methods used to segregate and characterize wastes at the Laboratory.

## 3.0 Scope

This guidance document is recommended for use by all Laboratory workers (including contractors and subcontractors) involved in waste generation. It is written to provide assistance to

- Any Laboratory worker who generates waste
- Any Laboratory personnel who assist waste generators
- Programmatic line managers and their designees responsible for implementing environmental, safety, and health requirements
- Personnel who write site-specific or internal procedure

## 4.0 Definitions/Acronyms

### 4.1 Acronyms

AK	Acceptable Knowledge	LIR	Laboratory
CWDR	Chemical Waste Disposal Request		Implementation Requirement
CFR	Code of Federal Regulations	MSDS	Material Safety Data Sheet
DOE	Department of Energy	NMAC	New Mexico Administrative Code
SWO	Solid Waste Operations	NPDES	National Pollutant Discharge Elimination System
EPA	U. S. Environmental Protection Agency		
ESH-18	Water Quality and Hydrology Group	RCRA	Resource Conservation and Recovery Act
ESH-19	Hazardous and Solid Waste Group	SWMU	Solid Waste Management Unit
JCNNM	Johnson Controls Northern New Mexico	TRU	Transuranic
Laboratory	Los Alamos National Laboratory	TSDF	treatment, storage, or disposal facility
LDR	Land Disposal Restrictions	TWSR	Transuranic Waste Storage Record
LIG	Laboratory Implementation Guidance	WAC	waste acceptance criteria
		WIPP	Waste Isolation Pilot Plant
		WMC	waste management coordinator
		WPF	Waste Profile Form

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### 4.2

#### Definitions

The following terms should be referred to when using this document.

**Characterization:** The determination of a waste's physical, chemical, and radiological characteristics with sufficient accuracy to permit proper segregation, treatment, storage, and disposal according to the final treatment, storage, or disposal facility's (TSDF's) waste acceptance criteria (WAC).

**Acceptable Knowledge:** A waste stream characterization method that can be used to meet all or part of the waste analysis requirements appropriate for the waste media. The method may include documented process knowledge, supplemental waste analysis data, and/or facility records of analysis.

**Verification sampling and analysis:** The process of sampling and analysis performed for the purpose of establishing the validity of AK.

**Sampling and analysis by approved methods:** Sampling and analysis methods approved by the regulating agency and/or the TSDF.

**Supplemental sampling and analysis:** Sampling and analysis methods that provide quality information but are not performed in accordance with approved methods.

## 5.0

### Responsibilities

These responsibilities are recommended to support the consistent characterization of Laboratory wastes.

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#### 5.1

##### Waste-generating division directors or designees

Waste-generating division directors or designees should

- Ensure all waste generators under their supervision implement this document.
  - Ensure documentation and records used to support AK are maintained in a retrievable and auditable manner.
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#### 5.2

##### Waste generators

Waste generators should

- Accurately and completely characterize their wastes.
- Provide documentation when using AK.

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### **5.3 Waste management coordinators (WMCs)**

Waste management coordinators (WMCs) should

- Assist the generators in characterization issues.
- Review the characterization documentation and records for accuracy and completeness.

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### **5.4 Treatment, storage, or disposal facilities**

Treatment, storage, or disposal facilities should

- Provide guidance on the waste-specific acceptability of AK.
- Review AK documentation for adequacy and completeness with respect to waste acceptance, characterization, and certification requirements.

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### **5.5 Hazardous and Solid Waste Group (ESH-19)**

The Hazardous and Solid Waste Group (ESH-19) should

- Provide sampling services.
- Provide regulatory guidance on solid and hazardous waste issues.

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### **5.6 Water Quality and Hydrology Group (ESH-18)**

The Water Quality and Hydrology Group (ESH-18) should

- Provide regulatory guidance for National Pollutant Discharge Elimination System (NPDES) issues.

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### **5.7 Solid Waste Operations Group (SWO)**

The Solid Waste Operations Group (SWO) should

- Maintain the document, "LANL Waste Management Facilities Waste Acceptance Criteria." (Individual facilities contribute WAC information to the document.)
- Provide guidance for WAC issues, in consultation with the facility.

## 6.0 Precautions and Limitations

There are specific requirements for use of AK with Transuranic (TRU) waste and TRU mixed waste due to the Waste Isolation Pilot Plant (WIPP) TRU Certification requirements. The TRU Waste Certification Group (CST-7) should be contacted for these requirements.

This document provides a general interpretation of the relevant standards for acceptable knowledge. It does not address all conceivable situations. Any suggestions involving changes to this guidance or questions concerning interpretation should be referred to SWO.

## 7.0 Acceptable Knowledge Guidance

### 7.1 Applying Acceptable Knowledge: Examples

The TSDF and/or ESH-19 should be contacted for a case-by-case determination of AK acceptability based on the WAC and the permit.

The following are some examples of where AK may be applied.

- Identifying waste streams that contain hazardous constituents from specific, well documented processes such as Resource Conservation and Recovery Act (RCRA) F-listed or K-listed waste-code descriptions.
- Managing waste streams consisting of discarded commercial chemical products, reagents, or chemicals of known physical and chemical composition (e.g., RCRA P-listed and U-listed wastes).
- Identifying wastes that involve quantified and documented radiological health and safety risks to personnel and so do not justify sampling and analysis.
- Characterizing waste streams, which contain heterogeneous materials, where the physical nature of the waste stream does not lend itself to taking a representative sample (e.g., laboratory trash and surface-contaminated construction debris).

### 7.2 Developing Acceptable Knowledge

The following should be considered as techniques in developing AK for waste characterization.

- Determine the hazardous constituents and/or hazardous characteristics of wastes that are not in their original labeled containers by using other information (such as Material Safety Data Sheets [MSDSs]) or previous analyses.
- Identify the administrative and operational controls that affect the characteristics or composition of the waste stream.
- Describe the waste-generating process. Identify the waste constituents and estimate constituent concentrations.

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- For waste generated during environmental restoration projects, obtain any relevant information collected during field activities (e.g., site investigations).
- Research the historical information that exists about a facility or site, such as:
  - Previous processes and operations
  - Solid Waste Management Units (SWMUs)
  - Procedures for processes
  - Inspection logs or reports
  - Off-normal events where contaminants may have been spilled
  - Waste management practices at the generator location
  - Physical characteristics
  - The environmental setting
  - The identification of hazardous materials used at the site
  - Data from previous environmental or waste stream sampling and analysis.
- Obtain information from archival searches, personnel interviews, and visual site inspections.

### 7.3 Using AK to Characterize Radioactive Constituents

The following methods may be used to segregate and characterize the radiological components of a waste stream. These methods may use source information, scaling factors, gross radiation measurements, and/or calculations.

**Source information.** If the radionuclides used in a controlled area are well-known and documented, and if operational controls limit the transfer of material containing other radionuclides into the area, the waste stream generated in this area may be segregated and characterized using source information.

**Scaling factors.** The radiological components of a waste stream may be segregated and characterized by using scaling factors to establish the activity of one radionuclide from the measured activity of another radionuclide. Activities of some radionuclides may be projected using scaling factors based on the amount of other directly measured radionuclides present in the waste stream. Ensure that indirect methods can be correlated with actual measurements. Scaled values should be verified periodically.

**Gross radiation measurements.** Gross radiation measurements may be used if there is a demonstrable correlation between the gross radiation (i.e., total decay rate) and the radionuclide content of the waste stream.

**Calculations.** When applicable, calculations may be used to identify radionuclides and estimate activities, provided that the computational methods and software used have been verified, validated, and documented. Ensure that the computational methods used to segregate and characterize wastes are described in the waste characterization documentation.

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Consider using data from material balance when characterizing a radioactive or mixed waste.

### 7.4 Preparing Acceptable Knowledge Documentation

AK documentation should clearly demonstrate that the information is sufficient to identify the waste stream accurately and completely. TSDF personnel may evaluate the adequacy of the documentation based on criteria established by the final TSDF (i.e., the WAC and/or permit requirements). See Attachment A for examples of AK sources. AK documentation should be obtained, prepared, and assembled for each waste stream or related waste streams. A graded approach should be used. Not every item in this list needs to be complete for every waste stream. The following items should be considered when preparing an AK characterization package:

- Ensure the AK documentation is relevant and traceable to a waste stream and not merely a list of information sources for a particular process operation.
- Document information that is relevant to the waste stream's generation, characterization, and management.
- The official documentation is signed and dated by the waste generator.
- Consider including such information for each waste stream or related waste stream as
  - The specific location of the waste-generating process/operation
  - A detailed description of the waste-generating process
  - The time period of generation
  - The person or persons responsible for the process operations and for waste management, including organization and point of contact information (i.e., the Waste Management Coordinator and/or the Waste Certification Official)

If some information cannot be revealed for security reasons, the Hazardous and Solid Waste Group should be contacted for guidance.

Provide sufficient information for TSDF personnel so that all waste stream constituents can be identified.

Procedures should be maintained to identify (and flag) when there are changes to the waste-generating process or to raw materials used in the process and to determine whether the characteristics of the waste stream changed from those specified on the WPF.

Inconsistencies should be evaluated. In case of discrepancies, the documentation pertaining to the specific waste stream should be evaluated in the following priority:

- 1) Relevant information from published documents and controlled databases
- 2) Unpublished data
- 3) Internal procedures and notes such as log books
- 4) Correspondence such as memoranda, letters, telephone logs, and interviews

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The justification for final waste characterization based on acceptable knowledge should be defensible. Any assumptions made should be identified and documented.

### 7.5 Acceptable Knowledge Methodology

The waste generator should implement the guidance below when AK will be used for waste characterization. A graded approach should be used. The methodology suggested below begins with pre-planning for waste generation and extends throughout the period of waste generation. All or part of the methodology may be used.

Step	Action
1.	Identify waste streams being generated.
2.	Identify available sources of characterization information and include in waste characterization package. See Attachment A for examples of AK sources.
3.	If sampling and analysis was used, include analysis report in waste characterization package.
4.	Develop and document material balances, scaling factors, and calculations, as appropriate.
5.	Ensure documents provide accurate and relevant AK information.
6.	Determine if sufficient documentation exists to justify the use of AK. TSDF personnel can provide assistance on what constitutes adequate AK for each waste type. SWO personnel can also provide assistance in this process.
7.	Collate and/or reference the AK documentation into a reference file specific to the applicable waste stream.
8.	Prepare a Waste Profile Form (WPF) for each identified waste stream being generated, noting the methods of characterization used.
9.	Make AK documentation available to the TSDF personnel evaluating the waste stream. If the number of documents is small and manageable, it is recommended to attach documentation to the WPF, Chemical Waste Disposal Request (CWDR), or TRU Waste Storage Record (TWSR). Otherwise, provide information on forms to allow tracking of documentation (for example, a summary sheet of the documentation used or a reference number to the file).

### 7.6 Generator Waste Stream Re-evaluation

Re-evaluation of individual or related waste streams, including re-evaluation of the basis of the AK, should be conducted as follows:

- Annually, at a minimum. It is recommended that the re-evaluation be done when extending a WPF.



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- Whenever assumptions or operating parameters change that could affect the AK documentation.
- When factors affecting waste characterization have occurred, such as when processes, procedures, or raw materials added to waste-generating processes have changed.
- Whenever the divisions or facility's waste characterization procedures change (if applicable) and when documentation changes, in order to ensure that AK is still current, accurate, and valid for the processes or activities being performed.

Other events may cause a need for re-evaluation of AK. AK methodology may no longer be defensible or accurate under the following circumstances:

- The operating permit is modified.
- Regulations affecting the definition of hazardous waste, land disposal restriction (LDR) standards, or waste analysis methods are promulgated or changed.
- DOE Orders affecting waste management are revised.
- New regulations affecting the management of existing waste streams are promulgated.

Generators should consider re-verifying their AK in accordance with their quality assurance plan.

Generators should document their AK re-evaluation and submit any changes to the applicable waste-accepting TSDF. If there is a change in the classification of a waste, generators should submit a new WPF.

## 8.0 Records

**REQUIREMENTS NOTE:** Title 40 CFR § 262.40[c] allows waste generators to discard original AK-related records after three years; however, the DOE requires that such records be retained for the life of the TSDF accepting the waste. The records are needed for historical purposes per TSDF Closure Plans.

The generator or generating facility should maintain a retrievable file of the AK documents for each waste stream or related waste streams in accordance with records management requirements. Original records sent with WPFs, CWDRs, and/or TWSRs should be managed under SWO Records Management and Document Control records management requirements.

Generators should transfer **original** AK records that are no longer needed by their facility to the Laboratory Records Center (CIC-10, 5-7900) for permanent storage and/or archiving.

## 9.0 References

### 9.1 Documents referred to in this document or containing requirements related to this document

- DOE Order 5700.6C, "Quality Assurance."
- DOE Order 5820.2A. "Radioactive Waste Management," most recent edition.
- DOE-AL Memorandum LESH:PBS:0031, "Moratorium on the Destruction of Records." Jack B. Tillman, dated May 2, 1990, pursuant to the DOE Secretary's directive, which requires records to be maintained indefinitely.
- *Hazardous Waste Facility Permit*, New Mexico Environment Department. Permit No. NM0890010515-1. November 8, 1989.
- Letter from DOE Secretary James Watkins, to Bruce Twining, dated March 26, 1990, which extends indefinitely the DOE records destruction moratorium, dated 3/15/1989.
- LIG404-00-01. "Waste Generator Guidance for Completing the TRU Waste Storage Record (TWSR)." Los Alamos National Laboratory.
- LIG404-00-03. "Waste Profile Form Guidance." Los Alamos National Laboratory.
- LIR404-00-03. "Hazardous and Mixed Waste Requirements for Generators." Los Alamos National Laboratory.
- NMSA Parts 74-4-1 to 74-4-13, "Hazardous Waste Act." State of New Mexico
- NMSA Parts 74-9-1 to 42, "Solid Waste Act." State of New Mexico.
- "Technical Area 50, Building 1; Rooms 35, 36, and 38/38A Container Storage Areas, Building 69; Waste Characterization, Reduction, and Packaging Facility Indoor and Outdoor Container Storage Areas, Technical Area 54 West, Building 38; Radioassay and Nondestructive Facility High Bay, Loading Dock and Outdoor Container Storage Areas." RCRA Permit Modification Request.
- *Test Methods for Evaluating Solid Wastes*, EPA Report SW 846.
- Title 20 NMAC Part 4.1, *Hazardous Waste Management Regulations*. State of New Mexico.
- Title 20, NMAC Part 9.1, *Solid Waste Management Regulations*. State of New Mexico.
- Title 40, CFR Parts 261-268. *Waste Analysis at Facilities that Generate, Treat, Store and Dispose of Hazardous Waste*, Environmental Protection Agency (EPA), OSWER 9938.4-03, April 1994.

### 9.2 Document Ownership

The OIC for this document shall be the Waste Management Policy and Procedure Council

## 10.0      **Attachment A. Examples of Information Sources for Acceptable Knowledge**

Examples of AK documentation used at the Laboratory may include, but are not limited to the following:

- Process design documents
- Final safety analysis reports (SARs), unreviewed safety question determinations (USQDs), and technical safety requirements (TSRs)
- Safe Operating Procedures (SOPs), Hazard Control Plans (HCPs), Activity Hazard Analysis (AHAs), and Detailed Operating Procedures (DOPs) that list raw materials or reagents, that describe the process/experiment which uses the materials, and that describe how the waste streams are generated and handled
- Waste packaging logs completed when wastes are placed in containers
- Test plans or research project reports that describe the reagents and other raw materials used in an experiment
- Laboratory notebooks that detail the research processes and materials used in an experiment and the by-products and end-products generated
- Site databases (e.g., chemical inventory database for Superfund Amendments and Reauthorization Act [SARA] Title III)
- Documented site personnel interview information
- Standard industry practice documents (e.g., vendor information)
- Previous analytical data relevant to the waste stream, such as fingerprint analysis, spot-check procedures, or routine waste stream verification sampling and analysis data
- Material Safety Data Sheets (MSDSs), product labels, and other product packaging information
- Documented visual inspections that can be used to identify or confirm the physical characteristics and packaging of a waste (e.g., visual inspection forms, which can be explicit in the type of information to be collected, or detailed procedures on how these observations are recorded)
- Documentation that demonstrates that surrogate materials accurately reflect the characteristics of the waste stream in question